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Field Sampling Plan for Groundwater Monitoring under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004

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Revision 4

Field Sampling Plan for Groundwater Monitoring under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004

June 2003

Idaho National Engineering and Environmental Laboratory
Idaho Completion Project
Idaho Falls, Idaho 83415

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U.S. Department of Energy
Assistant Secretary for Environmental Management
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ABSTRACT

The purpose of this plan is to direct the field sampling team in sampling efforts to support the Operable Unit 10-08 remedial investigation; describe the number, type, and location of samples; and describe the types of analyses to be performed. Operable Unit 10-08 is located within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory. Information from this investigation will expand the baseline of groundwater information used to develop a plan for future Sitewide groundwater monitoring.

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ACRONYMS

ARDC	Administrative Record and Document Control
COC	chain of custody
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
FTL	field team leader
GDE	guide
GFPC	gas flow proportional counting
HDPE	high-density polyethylene
INEEL	Idaho National Engineering and Environmental Laboratory
L&V	limitations and validation
LSC	liquid scintillation counting
MCP	management control procedure
OU	operable unit
PPE	personal protective equipment
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RDX	royal demolition explosive (cyclotrimethylene trinitroamine)
RI/FS	remedial investigation/feasibility study
SAM	Sampling and Analysis Managment
SAP	Sampling and Analysis Plan
SDWS	secondary drinking water standard
TNT	trinitrotoluene
USGS	United States Geological Survey
WAG	waste area group
WGS	Waste Generator Services

Field Sampling Plan for Groundwater Monitoring under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004

1. INTRODUCTION

1.1 Scope

Work described in this field sampling plan (FSP) supports the Operable Unit (OU) 10-08 Waste Area Group (WAG) 10 remedial investigation and feasibility study (RI/FS) under the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991) at the Idaho National Engineering and Environmental Laboratory (INEEL). Project goals are discussed in the *Waste Area Group 10, Operable Unit 10-08, Remedial Investigation/Feasibility Study Work Plan (FINAL)* (DOE-ID 2002a).

The sampling and analysis plan (SAP) consists of two parts: this FSP and the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002b). This FSP has been prepared in accordance with INEEL Idaho Completion Project management control procedures (MCPs) and guidance from the U.S. Environmental Protection Agency (EPA) document, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988). This FSP describes the field activities that will occur, and the *Quality Assurance Project Plan* (QAPjP) (DOE-ID 2002b) describes the processes and programs that ensure generated data will be suitable for its intended use.

1.2 Purpose

The purpose of this FSP is to guide the OU 10-08 field team in collecting groundwater samples on a regular, defined schedule from a limited number of boundary, guard, and baseline wells in Fiscal Years 2002, 2003, and 2004. Objectives of this investigation are discussed in detail in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a).

1.3 Background

The INEEL is a U.S. Department of Energy facility located 52 km (32 mi) west of Idaho Falls, Idaho, and occupies 2,305 km^2 (890 mi^2) of the northeastern portion of the eastern Snake River Plain (Figure 1). Comprehensive INEEL historical and geological information relevant to the INEEL is provided in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a).

Under the *Federal Facility Agreement and Consent Order* process, OU 10-08 is responsible for determining the nature and extent of contamination and potential risks to human health and the environment posed through the Snake River Plain Aquifer.

The scope of the OU 10-08 remedial investigation includes comprehensive investigation and characterization activities to (1) fill data gaps identified in the OU 10-08 modeling and in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a), and (2) obtain adequate data to prepare the OU 10-08 RI/FS and subsequently the OU 10-08 record of decision. Risk assessment modeling performed by other WAGs will not be duplicated; instead, only impacts from groundwater contaminant plumes commingling from each WAG will be evaluated.

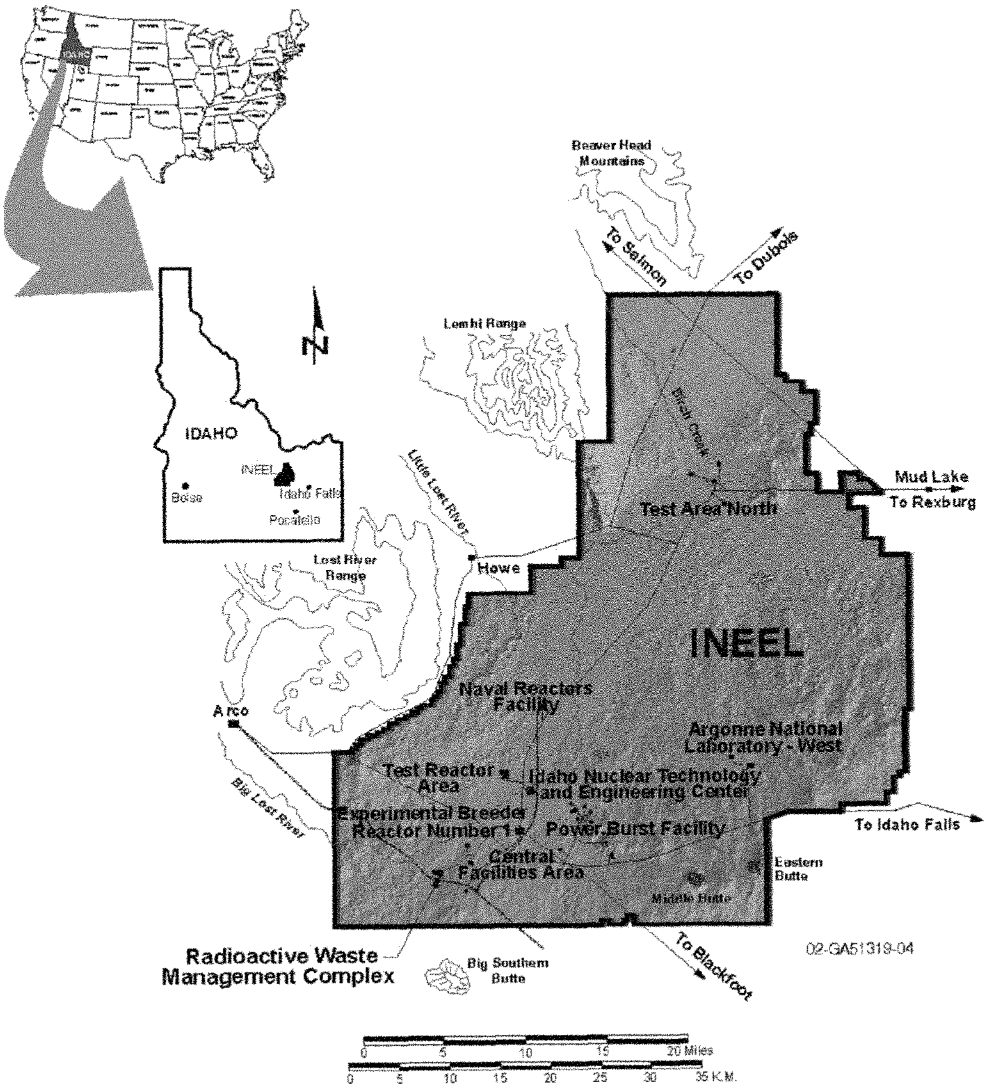

Figure 1. Idaho National Engineering and Environmental Laboratory.

1.4 Existing Data

The United States Geological Survey (USGS) has performed numerous environmental studies and investigations in and around the INEEL. Data from USGS wells and from USGS samples collected at OU 10-08 wells will be used along with data generated during Idaho Completion Project groundwater sampling activities. Additional discussion is available in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a).

1.4.1 Identification of Data Gaps

The USGS and other organizations have studied the hydrogeology of the INEEL for over 40 years. Groundwater studies specific to various facilities have been conducted since 1971. The *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a) provides a discussion of known and suspected contaminant sources and outlines the plan to identify data gaps pertaining to groundwater.

2. DATA USES

2.1 Data Quality Objectives

Data quality objectives (DQOs) for OU 10-08 groundwater sampling are contained in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a).

During the DQO scoping process, the original directions and assumptions identified for evaluating groundwater in the *Work Plan for Waste Area Groups 6 and 10 Operable Unit 10-04 Comprehensive Remedial Investigation/Feasibility Study* (DOE-ID 1999) are still considered valid. These directions and assumptions are listed below:

- Historical groundwater data will be consolidated and reviewed to eliminate the requirement for collecting new data to the extent practicable

- Groundwater data previously obtained for other INEEL activities are of sufficient quality to support the OU 10-08 RI/FS decision process.

2.2 Action Levels

Analytes and action levels for the guard, baseline, and boundary wells are listed in Table 1. The SAP tables, included as Appendix A, show wells to be sampled and laboratory analyses for each sample.

Table 1. Operable Unit 10-08 analytes and required quantitation levels.

Contaminant Type	Contaminant Name	Action Level or Maximum Contaminant Levels	Practical Quantitation Limit or Level Required (at least half maximum contaminant level)	Analytical Method
Organics	Carbon tetrachloride	0.005 mg/L	0.001 mg/L[a]	All by EPA Method 8260 Appendix IX group
Volatile organic compounds	cis-1,2-Dichloroethene	0.07 mg/L	0.001 mg/L[a]	
	Methylene chloride	0.005 mg/L	0.001 mg/L[a]	—
	Tetrachloroethene	0.005 mg/L	0.001 mg/L[a]	—
	Trans-1,2-dichloroethene	0.1 mg/L	0.001 mg/L[a]	—
	Trichloroethene	0.005 mg/L	0.001 mg/L[a]	—
Inorganics (contract laboratory program metals plus silicon and strontium)	Arsenic	0.05 mg/L	0.005 mg/L	b
	Beryllium	0.004 mg/L	0.001 mg/L	b
	Cadmium	0.005 mg/L	0.001mg/L	b
	Chromium	0.1 mg/L (total)	0.002 mg/L	b
	Lead	0.015 mg/L	0.002 mg/L	b
	Mercury	0.002 mg/L	0.0001 mg/L	b
	Zinc	5 mg/L (SDWS [5])	0.020 mg/L	b
Other	Nitrate (as nitrogen)	10 mg/L	0.5 mg/L	c
	Chloride	250 mg/L (SDWS [5])	0.5 mg/L	EPA Method 300
	Fluoride	4.0 mg/L (2.0 mg/L SDWS [5])	0.5 mg/L	EPA Method 300
	Sulfate	250 mg/L (SDWS [5])	5 mg/L	EPA Method 300
	TNT	0.1 mg/L[d]	0.05 mg/L	EPA Method 8330
	RDX	0.03 mg/L[d]	0.015 mg/L	EPA Method 8330

Table 1. (continued).

Contaminant Type	Contaminant Name	Action Level or Maximum Contaminant Levels	Practical Quantitation Limit or Level Required (at least half maximum contaminant level)	Analytical Method
Radionuclides	Gross alpha	15 pCi/L (total)	2 pCi/L	GFPC
	Gross beta (manmade)	Not to exceed 4 mrem/year to the whole body or any organ	4 pCi/L	GFPC
	Gamma emitters (Cs-137)	200 pCi/L (total)	10 pCi/L[e]	Gamma specification
	Uranium	0.030 mg/L (total)	0.5 pCi/L	Alpha specification
	I-129	1 pCi/L	0.1 pCi/L	LSC
	Sr-90	8 pCi/L	0.5 pCi/L	GFPC
	C-14	2,000 pCi/L	3 pCi/L	LSC
	Tc-99	900 pCi/L	10 pCi/L	GFPC; LSC
	H-3	20,000 pCi/L	400 pCi/L	LSC

a. Based on 25-mL sample volume.
b. Using EPA Document No. EPA-600/4-79-020, "Methods for Chemical Analysis of Water and Wastes" (EPA Method 150.2); or EPA-600/R-94/111 Methods, "Methods for the Determination of Metals in Environmental Samples Supplement 1" (EPA Method 200.8).
c. EPA Method 300.0, "Determination of Inorganic Anions by Ion Chromatography" (Revision 2.1); or 353.2, "Nitrate-Nitrite by Automated Colorimetry" (Revision 2.0).
d. Based on 1-in-10,000 risk-based action levels from the EPA Integrated Risk Information Service.
e. Based on Cs-137 with other gamma-emitting isotopes having detection limits commensurate with their photon yield and energy as related to that for Cs-137.

EPA = U.S. Environmental Protection Agency
GFPC = gas flow proportional counting
LSC = liquid scintillation counting
RDX = royal demolition explosive (cyclotrimethylene trinitroamine)
SDWS = secondary drinking water standard
TNT = trinitrotoluene

3. SAMPLING LOCATION, FREQUENCY, AND MEDIA

General well categories identified for sampling under this FSP include the following:

- Downgradient boundary wells
- Downgradient guard wells
- Upgradient baseline wells.

These general well categories are listed in order of sampling priority. Downgradient boundary and guard wells are considered the most important to fill data gaps. The priority for filling data gaps reflects the goal of compliance with maximum contaminant levels and cumulative risk thresholds in the groundwater from INEEL-released contaminants whether on or off-INEEL by Fiscal Year 2095. The project will provide the field team with guidance necessary to ensure that appropriate wells are sampled. Table 2 lists well identifiers, well numbers, and interval and depth information about the wells to be sampled. Groundwater monitoring wells will be sampled at least annually as discussed in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a) for the analyses shown in Appendix A, "Sampling and Analysis Plan Tables." Figures B-1 through B-3 in Appendix B show locations of the monitoring wells to be sampled.

Table 2. Specific well information.

Well Identifier	Primary Wells	Screened Interval (ft)	Depth to Bottom (ft)	Pump Depth (ft)	Approximate Depth to Water (ft)
Boundary Wells					
450	USGS-001	600 to 630	635.7	612	588
458	USGS-009	620 to 650	654.1	635	607
535	USGS-086	Open	691	678	649
550	USGS-101	750 to 865	865	790	771
552	USGS-103	Open	760	700	583
554	USGS-105	Open	800	700	670
557	USGS-108	Open	760	637	609
558	USGS-109	600 to 800	800	656	621
559	USGS-110	580 to 780	780	612	566
Guard Wells					
184	HIGHWAY 3	680 to 750	750	567	538
451	USGS-002	675 to 696	704	683	659
553	USGS-104	550 to 700 open hole	560	592	555
555	USGS-106	605 to 760 open hole	760	609	584

Table 2. (continued).

Well Identifier	Primary Wells	Screened Interval (ft)	Depth to Bottom (ft)	Pump Depth (ft)	Approximate Depth to Water (ft)
556	USGS-107	270 to 690 open hole	690	531	477
		Baseline Wells			
453	USGS-004	285 to 315 perforated	553	303	251
		322 to 553 open hole			
457	USGS-008	782 to 812	812	801	766
468	USGS-019	639 to 705	401	322	276
475	USGS-026	232 to 267	266.5	255	212
476	USGS-027	250 to 260 perforated	312	262	228
		298 to 308 perforated			
1346	USGS-126B	400 open hole	452	420	408
147	DH-1B	380 open hole	400	No pump	268
250	P&W-3	322 to 401	406	No pump	304

4. SAMPLE IDENTIFICATION

A systematic 10-character sample identification code will be used to uniquely identify all samples. Uniqueness of the number is required for maintaining consistency and ensuring that no two samples are assigned the same identification code. In addition, the sample identification code identifies the WAG conducting the sampling, the sample type, and whether the sample is a duplicate. In addition, the code's two-letter suffix (analysis code) can be used to identify the requested analysis for each sample. Sampling and Analysis Management (SAM) assigns the sample numbers. The Integrated Environmental Data Management System is used to ensure that each sample is uniquely identified.

5. SAMPLING EQUIPMENT AND PROCEDURES

Sample collection is discussed in Section 5.1. Groundwater monitoring wells (see Table 2) will be sampled for the analyses shown in SAP tables contained in Appendix A. When possible, sampling will be coordinated with USGS personnel.

5.1 Sample Collection

5.1.1 Site Preparation

All required documentation and safety equipment will be assembled at the well-sampling site, including radios, fire extinguishers, personal protective equipment (PPE), bottles, and accessories.

Before sampling, all sampling personnel are responsible for reading this SAP and the *Health and Safety Plan for the Environmental Restoration Long-Term Sitewide Groundwater Monitoring* (Gurney 2003). The field team leader (FTL) will perform a daily site briefing to discuss potential hazards and to ensure that all personnel have the required training. The FTL will assign a team member to maintain document control and will note this appointment in the WAG 10 Groundwater Sample Logbook in accordance with MCP-1194, "Logbook Practices for Environmental Restoration and D&D&D Projects."

All sampling equipment that comes in contact with sample media will be cleaned in accordance with Guide (GDE) -140, "Decontaminating Sampling Equipment." The exception to this will be dedicated submersible sampling pumps. Sampling manifolds will be either decontaminated before bringing them to the field or decontaminated following use in each well before use on another well.

5.1.2 Field Measurements

Initially, the field team will establish the work control zone as indicated in the *Groundwater Monitoring Health and Safety Plan* (Gurney 2003), don appropriate PPE, and measure the depth to water. Water-level data are used to determine the volume of water that must be purged before sampling. The field team will measure water levels at each well before purging using either an electronic measuring device or a steel tape measure. In addition, the field team will record barometric pressure at each well at the time water-level depths are determined. A post-sampling water-level measurement is not required. In addition to the water level measurement, the field team also will measure the height from the depth-to-water measuring point to the top of the well casing and the stickup of the well casing either above the ground surface or the well pad. Field procedures for measuring water levels in wells are included in GDE-128, "Measuring Groundwater Levels."

Table 2 shows the primary wells that will be sampled. The project will supply the field team with necessary well-completion data. The field team will calculate the purge volume based on the current water level and will record all calculations on the well-purging data form. The project will supply the field team with the approximate historical purge volume as a crosscheck.

An inline flow meter may be attached to the sampling apparatus before purging to provide an accurate indicator of the pumping rate. If used, the portable inline flow meter will be attached downstream of the sampling port so that contamination of the flow-meter assembly between wells does not occur. The prepurge flow-meter reading will be recorded on the well-purging data form so that the total volume purged can be recorded upon sample completion. If an inline flow meter is not used, then the purge-water flow volume will be measured using a measured bucket and a watch to measure the approximate flow rate. This will be done by measuring the amount of time it takes to fill a specific volume of the bucket (e.g., 1 or 5 gal).

5.1.3 Well Purging

The field team will use GDE-127, "Sampling Groundwater," and specific well information to calculate purge volumes. Management of any waste produced is discussed in Section 9.

During the purging operation, the field team will use the Hydrolab (DataSonde or MiniSonde) or an equivalent instrument to measure purge water for specific conductance, pH, dissolved oxygen, and temperature. If the system allows for measurement of oxidation-reduction potential, then those data also will be collected. The field team will complete a functional check on the Hydrolab (or equivalent instrument) in accordance with instructions in the manufacturer's manual. If extremes in temperature occur, the FTL may determine that a functional check should be performed more frequently. The field team will follow the factory-provided operating manual when using the Hydrolab DataSonde, MiniSonde, or equivalent, system.

In accordance with GDE-127, the field team will collect initial readings for specific conductance, pH, dissolved oxygen, temperature, and flow rate just after purging begins and at regular intervals thereafter. All Hydrolab (or equivalent instrument) readings will be recorded on the well-purging data form. The flow rate will be recorded in the WAG 10 Groundwater Sample Logbook. Space is available in the logbook to record readings for total dissolved solids (65% of the conductivity reading). Water parameter readings will provide a check on stability of the water sampled over time.

In compliance with GDE-127, groundwater samples will be collected following purging and collection of field measurements. Table 3 outlines specific requirements for containers, preservation methods, sample volumes, and holding times for these analyses. Special requirements for volatile organics are included in GDE-127. Samples collected for metals analysis will be filtered during sample collection. The preferred order for water sample collection is covered in GDE-127.

Table 3. Specific groundwater sample requirements for routine monitoring.

	Container			
Analytical Parameter	Size	Type	Preservative	Holding Time
Volatile organics[a] (SW-846-8260)	40 mL	Three glass vials with Teflon septa	4°C and H_2SO_4 to pH <2	14 days
Nitroaromatics (TNT and RDX)	1 or 2 L[b]	Amber glass	Cool 4°C	Collection to extraction: 7 days. Extraction to analysis: 40 days.
Total metals—filtered Contract Laboratory Program list	2 L	Glass or plastic	pH <2, HNO_3	All metals are 6 months, except mercury, which is 28 days
Anions	125 mL	Glass or plastic	4°C	28 days
Bicarbonate	500 mL	Glass or plastic	4°C	14 days
Nitrate (as nitrogen)	125 mL	Glass or plastic	4°C	48 hours

Table 3. (continued).

Analytical Parameter	Container Size	Container Type	Preservative	Holding Time
H-3	125 mL	HDPE	None	6 months
Gamma spectroscopy; gross alpha/beta; Sr-90; uranium isotopes; Tc-99 analysis	5 L	HDPE	HNO_3 to pH <2	6 months
C-14	500 mL	HDPE	None	6 months
I-129	6 L	Amber glass or HDPE	None	28 days in HDPE 180 days in amber glass

a. Volatile organic analysis.

b. The volume depends on which laboratory is selected for performing the analysis.

Note: Aqueous organics: One sample will be collected in triplicate volume for each analysis.

HDPE = high-density polyethylene
RDX = royal demolition explosive (cyclotrimethylene trinitroamine)
TNT = trinitrotoluene

6. SAMPLE HANDLING, PACKAGING, AND SHIPPING

After groundwater samples are collected from the well, the gloved sampling technician wipes the bottles to remove residual water and places them in custody of the designated sample custodian. The sample custodian or shipper is responsible for ensuring that clear tape is placed over bottle labels, lids are checked for tightness, parafilm (excluding volatile organic analysis samples) is placed around lids, and samples are bagged and properly packaged before shipment. Additional information is found in MCP-3480, "Environmental Instructions for Facilities, Processes, Materials, and Equipment."

6.1 Field Screening for Radionuclides

Groundwater samples have been collected periodically from INEEL wells for several decades. Laboratory results from all of these samples show that the samples are orders of magnitude below the U.S. Department of Transportation classification of radioactive material. Based on process knowledge from previous monitoring results and because all samples are collected from wells outside the facility fences, neither a field sample radiation screen nor a laboratory shipping screen will be required for these groundwater samples.

6.2 Sample Shipping

Samples will be transported in accordance with regulations issued by the U.S. Department of Transportation (49 CFR 171 through 178) and EPA sample handling, packaging, and shipping methods (40 CFR 262 Subpart C and 40 CFR 263). Additional information is found in MCP-3480. All samples will be packaged and transported to protect sample integrity and to prevent sample leakage.

Upon receipt, laboratory personnel will check the temperature of each cooler in accordance with the laboratory subcontract. The laboratory will communicate these temperatures to field personnel, and to the project through the SAM, to ensure adequate coolant is used to cool samples during shipment (if cooling is required). In addition, the laboratory will communicate any other discrepancies (e.g., broken samples or loss of chain of custody [COC]) to the project through the SAM. The project will determine appropriate corrective actions on a case-by-case basis.

7. DOCUMENTATION

Elements of sample documentation discussed in this section are covered in additional detail in the QAPjP (DOE-ID 2002b). The FTL or designee is responsible for controlling and maintaining all field documents and records and for ensuring that all required documents are submitted to the Administrative Record and Document Control (ARDC) coordinator.

Field changes requiring document revision will be implemented by the FTL in accordance with the latest revision of MCP-135, "Creating, Modifying, and Canceling Procedures and Other DMCS-Controlled Documents." All entries will be made in permanent, nonsmearable, black ink. All errors will be corrected by drawing a single line through the error and entering the correct information. All corrections will be initialed and dated. Sampling activities occasionally require procedural variations to complete the task. These small deviations in procedure are one-time events for which document action requests are not necessary. However, any deviations will be recorded in the WAG 10 Groundwater Sample Logbook.

The serial number or identification number and disposition of all controlled documents (e.g., COC forms) will be recorded in the ARDC logbook maintained by the ARDC in the Technical Support Building in Idaho Falls, Idaho. If a document is lost, a new document will be completed. The loss of a document and an explanation of how the loss was rectified will be recorded in the ARDC logbook maintained by ARDC in the Technical Support Building in Idaho Falls, Idaho. Serial numbers and the disposition of all damaged or destroyed field documents also will be recorded. All voided and completed documents will be maintained in the project file located in the Technical Support Building in Idaho Falls, Idaho, until completion of the sampling events; at which time all logbooks, unused tags and labels, and COC copies will be submitted to the SAM.

Field documents necessary for this project are listed below:

- Chain of custody forms
- Waste Area Group 10 Groundwater Sample Logbook, which will include shipping data, field instrument calibration and standardization logbook, visitor's sign-in, and FTL notes and comments
- Quality Assurance Project Plan (controlled copy)
- Field Sampling Plan and attachments (controlled copy)
- Health and Safety Plan (controlled copy).

7.1 Field Documentation

7.1.1 Labels

A sample label will be used on each sample. Waterproof, gummed labels will be used. Labels may be affixed to sample containers before going to the field and completed on the actual sample date. The label will contain the sample collection time and date, preservation used, type of analysis, and any other pertinent information. Labels will remain in the custody of the FTL or designee, when not in use.

7.1.2 Chain of Custody Forms

The COC record is a multiple-copy form that serves as a written record of sample handling. When a sample changes custody, the person(s) relinquishing and receiving the sample will sign a COC record. Each change of possession will be documented. Thus, a written record that tracks sample handling will be established. Completed forms ultimately are submitted to the ARDC. Additional COC information is found in MCP-3480.

7.1.3 Logbooks

The logbook applicable to this project will be the WAG 10 Groundwater Sample Logbook. Information necessary to interpret analytical data will be recorded and maintained in accordance with "Logbook Practices for Environmental Restoration and D&D&D Projects" (TPR-1194). All information pertaining to sampling activities will be entered in the WAG 10 Groundwater Sample Logbook. Entries will be dated and signed by the individual making the entry. As a quality control (QC) measure, all logbooks will be checked for accuracy and completeness by the FTL or designee.

The field team will use the WAG 10 Groundwater Sample Logbook as a sample-shipping logbook. Each sample will be entered in the logbook. This logbook will be used to record the sample identification number, collection date, shipping date, COC number, cooler number, destination, sample shipping classification, name of shipper, and signature of the person performing the QC check.

Each piece of equipment, as necessary, will have information and a record in the WAG 10 Groundwater Sample Logbook on the calibration data. Team members will record information pertaining to the calibration of equipment used during this project.

Daily accounting of information related to this sampling project, including problems encountered, deviations from the SAP, and justification for field decisions, will be recorded by the FTL in the WAG 10 Copies of the logbook pages will be sent to the project at completion of each round of sampling.

7.1.4 Photographic Records

To verify well conditions, the field team will collect a digital photograph of the well site and well head before and after sampling.

7.1.5 Field Guidance Forms

The field team may use field guidance forms to facilitate sample container documentation and to organize field activities. Field guide forms contain information on the laboratory, analysis description and type number, minimum sample quantity, preservative requirements, container type, and allowable hold time.

7.1.6 Waste Management Guidance

For each well, the project will provide the field team with documentation about the approximate purge volume and the required waste management options for the purge volume.

7.2 Project Organization and Responsibility

Specific individuals will be assigned as needed to the following project positions during performance of monitoring activities:

- Safety engineer
- Field team leader
- Radiological control technician
- Industrial hygienist
- Quality engineers
- Facility manager or representatives
- Sampling and Analysis Management point of contact
- Administrative Record and Document Control coordinator
- Radiological engineer
- Occupational Medical Program representative
- Project manager
- Project engineer
- Task lead.

With the exception of the SAM point of contact and the ARDC coordinator, the *Groundwater Monitoring Health and Safety Plan* should be consulted for overall organizational structure and specific personnel responsibilities. In addition to responsibility descriptions, the *Groundwater Monitoring Health and Safety Plan* ensures implementation of occupational health and safety requirements.

8. WASTE MINIMIZATION

As part of the prejob briefing, emphasis will be placed on waste reduction methods and personnel will be encouraged to continuously attempt to improve methods. Personnel will not use, consume, spend, or expend equipment or materials thoughtlessly or carelessly. Practices instituted to support waste minimization will include, but are not limited to, the following:

- Restricting materials (especially hazardous material) to those required for work performance
- Substituting recyclable or burnable items for disposable items
- Reusing items when practical
- Segregating contaminated from uncontaminated waste
- Segregating reusable items such as PPE and tools.

9. HANDLING AND DISPOSITION OF INVESTIGATION-DERIVED WASTE

All waste dispositioning will be coordinated with the appropriate Waste Generator Services (WGS) interface to ensure compliance with applicable waste storage, characterization, treatment, and disposal requirements.

Investigation-derived waste produced during sampling will include spent and unused sample material, PPE, miscellaneous sampling supplies, decontamination water, purge water, and samples. The WGS will provide a determination for the disposition of all waste, including purge water, based on a waste determination and disposition form. In addition to the WGS interface, Appendix G of the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a) includes instructions for handling investigation-derived waste for this project.

Before sampling, the project will provide the field team with the WGS-generated waste determination and disposition form for each well. This form describes the required disposal option for purge water. Purge water from a majority of wells to be sampled under this FSP is anticipated to be eligible for release to the ground surface. In addition, to help ensure the purge volume is correct, the project will provide samplers with the approximate volume of water purged from the well during a previous sampling round.

If, because of radionuclides, chemicals, or regulatory restrictions, the purged groundwater must be containerized for specific wells, then containerization will be done as long as a disposal option for the containerized purge water is available. If a purge water disposal option is not available, then WAG 10 will make a reasonable effort to find a disposal option before sampling the well and to reduce generation of this waste. For example, if the opportunity exists for those sites that have specific purge water disposal restrictions, the groundwater monitoring and sampling team will sample concurrently with other programs or WAGs to eliminate duplication and to provide for the most efficient and compliant management of purge water by those programs.

10. QUALITY

The objective of this investigation is to provide groundwater sample analytical data of sufficient quality and quantity to fill the data gaps identified in the *OU 10-08 RI/FS Work Plan* (DOE-ID 2002a). This FSP is used in conjunction with the QAPjP (DOE-ID 2002b) as the OU 10-08 SAP. These documents present the functional activities, organization, and quality assurance (QA) and QC protocols necessary to achieve the specified DQOs. Project-specific quality requirements not addressed in the QAPjP (DOE-ID 2002b) or elsewhere in this document are discussed in this section.

10.1 Quality Control Sampling

As outlined in the QAPjP (DOE-ID 2002b), QA objectives are specified so that data produced are of a known and sufficient quality for determining whether a risk to human health or to the environment exists. Minimum precision, accuracy, and completeness measurements and minimum detection limits are quantitative objectives specified in the QAPjP. Representativeness and comparability are qualitative objectives. During the sampling discussed in this plan, field QC samples (including field blanks, duplicates, and trip blanks) will be collected and analyzed to evaluate achievement of precision and accuracy objectives specified in the QAPjP. Frequency of field QC sample collection will meet or exceed the minimum recommended number in the QAPjP. Overall (field and laboratory) precision will be evaluated through results of duplicate groundwater samples and field blanks. Duplicate samples, equipment rinsates, and field blanks will be analyzed for the same suite of analytes as the regular groundwater samples. Trip blanks will be included in each sample cooler shipped to the laboratory that contains volatile organic compound sample containers. The QA/QC samples to be collected and the planned analyses also are shown in Appendix A.

10.1.1 Performance Evaluation Samples

Environmental analyses are critical because decisions based on inaccurate measurements or data of unknown quality can have significant economic and health consequences. To assess accuracy and precision of the laboratory results, performance evaluation samples will be added, if available, to sample delivery groups of groundwater samples. Performance-evaluation samples are spiked with known concentrations of radionuclides or chemicals in levels similar to those expected in the actual samples. They will be identified in the SAP table by the location designator "MP2." Laboratory accuracy and precision will be evaluated based on their analytical results.

10.2 Quality Assurance Objectives

As outlined in the QAPjP (DOE-ID 2002b), QA objectives are specified to ensure that data produced are of a known and sufficient quality. Minimum precision, accuracy, completeness requirements, and minimum detection limits are quantitative QA objectives specified in this plan or in the QAPjP. Representativeness and comparability are qualitative QA objectives.

10.2.1 Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. In the field, precision is affected by sample collection procedures and by the natural heterogeneity encountered in the environment. Overall precision (field and laboratory) can be evaluated by the use of duplicate samples collected in the field. Greater precision typically is required for analytes with very low action levels that are close to background concentrations.

Laboratory precision will be based on the use of laboratory-generated duplicate samples or matrix spike/matrix spike duplicate samples. Evaluation of laboratory precision will be performed during the method data validation process.

Field precision will be based on the analysis of collected field duplicate or split samples. For samples collected for laboratory analysis, a field duplicate will be collected at a minimum frequency of one in 20 environmental samples.

10.2.2 Accuracy

Accuracy is a measure of bias in a measurement system. Laboratory accuracy is demonstrated using laboratory control samples, blind QC samples, and matrix spikes. Performance evaluation samples submitted by the project will aid in assessing laboratory accuracy. Evaluation of laboratory accuracy will be performed during the method data validation process. Sample handling, field contamination, and the sample matrix in the field affect overall accuracy. By evaluating results from field blanks, trip blanks, and equipment rinsates, false positive or high-biased sample results will be assessed.

Field accuracy will only be determined for samples collected for laboratory analysis. Accuracy of field instrumentation will be ensured through the use of appropriate calibration procedures and standards.

10.2.3 Minimum Detection Limits

Minimum detection limits for this project correspond to maximum contaminant levels. In all cases, the contract-required quantitation limits and contract-required detection limits will be at least one-half of the maximum contaminant level.

10.2.4 Critical Samples

Most of the proposed groundwater samples are required to meet the project objectives; therefore, if groundwater samples cannot be obtained, then a determination will be made on a case-by-case basis as to whether an alternative well will be sampled.

10.2.5 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which the sampling and analysis data accurately and precisely represent the characteristic of a population parameter being measured at a given sampling point or for a process or environmental condition. Representativeness will be evaluated by determining whether measurements are made and physical samples are collected in such a manner that the resulting data appropriately measure the media and phenomenon measured or studied. The comparison of all field and laboratory analytical data sets obtained throughout this monitoring activity will be used to ensure representativeness.

10.2.6 Comparability

Comparability is a qualitative characteristic that refers to the confidence with which one data set can be compared to another. At a minimum, comparable data must be obtained using unbiased sampling designs. If sampling designs are not unbiased, the reasons for selecting another design should be well documented. Data comparability will be assessed through the comparison of all data sets collected during this monitoring activity for the following parameters:

- Data sets will contain the same variables of interest

- Units will be expressed in common metrics
- Similar analytical procedures and QA will be used to collect data
- Time of measurements of variables will be similar
- Measuring devices will have similar detection limits
- Samples within data sets will be selected in a similar manner
- Number of observations will be of the same order of magnitude.

10.2.7 Completeness

Completeness is the measure of the quantity of usable data collected during the field sampling activities. The QAPjP (DOE-ID 2002b) requires that an overall completeness goal of 90% be achieved for noncritical samples. If critical parameters or samples are identified, a 100% completeness goal is specified. Critical data points are those sample locations or parameters for which valid data must be obtained in order for the sampling event to be considered complete. Given that this is a monitoring project, all field screening and laboratory data will be considered noncritical with a 90% completeness goal.

11. DATA VALIDATION, REDUCTION, AND REPORTING

Data for the groundwater analysis will receive Level A validation. Level A data validation is a thorough process performed to evaluate subcontractor conformance to both contractual and technical criteria and is documented with a limitations and validation (L&V) report. The L&V report consists of the following:

- **Data confirmation**, which is the process of correlating the reported data within a given data package to its corresponding raw data. When applicable, this correlation also includes data reduction.

- **Data reduction,** which is the process of transforming raw data into reported data. This process includes implementation of all applicable unit-conversion calculations and data adjustment from techniques employed to dilute or concentrate samples.

- **Data clarification**, which is the process of qualifying or flagging reported analytical results, based on strict adherence to the applicable validation procedure and justifiable professional judgment by the data validator.

- **Data appraisal**, which is the formulation of a comprehensive L&V report that documents the entire method-data validation process.

The L&V report is written by an analytical chemist or other technical expert performing data validation. This report documents any deficiencies in the data identified during the method-data validation. A separate L&V report is required for each data package that undergoes method-data validation. For each sample delivery group, a data L&V will be generated, including copies of COC forms, sample results, and validation flags. All data L&V reports will be submitted to DOE-ID for transmittal to EPA and the Idaho Department of Environmental Quality within 120 days from the last day of sample collection. All definitive data will be uploaded to the Groundwater Sample Analysis Database.

12. REFERENCES

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Appendix A

Sampling and Analysis Plan Tables

Appendix A

Sampling and Analysis Plan Tables

The Operable Unit 10-08 field team will collect groundwater samples on a regular, defined schedule from a limited number of boundary, guard, and baseline wells in Fiscal Years 2002, 2003, and 2004. The sampling and analysis plan tables included in this appendix show the wells to be sampled and the laboratory analyses for each sample. The quality assurance and quality control samples to be collected and the planned analyses also are shown.

Plan Table Number: WAG10 GW JUN 03

SAP Number: INEEL/EXT-01-01529 REV 2.

Date: 05/14/2003 Plan Table Revision: 5.0 Project: OU10-08 GROUND WATER, JUNE 2003 (FY-03 THIRD ROUND) Project Manager: WOOD, T. R. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										AN	B9	CW	UX	Q6	5X	RH	XX	R8	AV	AZ									
GWM242	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-001	588	1	1		1	1		1	1	1	1										
GWM243	REG/QC	GROUND WATER	DUP		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-009	607	2	2	2	2	2		2	2	2	2										
GWM244	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-086	649	1	1	1	1	1		1	1	1	1										
GWM245	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-101	771	1	1		1	1		1	1	1	1										
GWM246	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-103	583	1	1		1	1		1	1	1	1										
GWM247	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-105	670	1	1	1	1	1		1	1	1	1										
GWM248	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-108	609	1	1		1	1		1	1	1	1										
GWM249	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-109	621	1	1	1	1	1		1	1	1	1										
GWM250	REG	GROUND WATER	GRAB		06/16/2003	INEELBOUNDARY	AQUIFER WELLS	USGS-110	566	1	1		1	1		1	1	1		1									
GWM251	REG	GROUND WATER	GRAB		06/16/2003	GUARD WELLS	AQUIFER WELLS	USGS-002	659	1	1		1	1		1	1	1	1										
GWM252	REG	GROUND WATER	GRAB		06/16/2003	GUARD WELLS	AQUIFER WELLS	USGS-104	555	1	1		1	1		1	1	1	1										
GWM253	REG	GROUND WATER	PES		06/16/2003	GUARD WELLS	AQUIFER WELLS	MP2	TBD										1										
GWM254	REG	GROUND WATER	PES		06/16/2003	GUARD WELLS	AQUIFER WELLS	MP2	TBD	1				1			1												
GWM255	REG	GROUND WATER	PES		06/16/2003	GUARD WELLS	AQUIFER WELLS	MP2	TBD				1			1		1											
GWM256	REG	GROUND WATER	GRAB		06/16/2003	GUARD WELLS	AQUIFER WELLS	USGS-106	584	1	1		1	1		1	1	1	1										

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Anions
AT2: Bicarbonate
AT3: C-14
AT4: Iodine-129 (low detection level)
AT5: Nitrate (as Nitrogen)
AT6: Nitroaromatics (8330) MS/MSD
AT7: Radiochemistry - Suite 1
AT8: Total Metals - Filtered
AT9: Tritium
AT10: VOCs (Appendix IX TAL)

AT11: VOCs (Appendix IX TAL) - MS/MSD
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Total Metals = complete CLP TAL plus silica and strontium. The total metals contaminants of potential concern (COPCs) are: arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc.

Anions defined as chloride, sulfate, and fluoride

Analysis Suites:

Radiochemistry - Suite 1: Tc-99, Gross Alpha, Gross Beta, Gamma Spec, U-Iso, Sr-90

Contingencies:

Plan Table Number: WAG10 GW JUN 03

SAP Number: INEEL/EXT-01-01529 REV 2.

Date: 05/14/2003 Plan Table Revision: 5.0 Project: OU10-08 GROUND WATER, JUNE 2003 (FY-03 THIRD ROUND) Project Manager: WOOD, T. R. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										AN	B9	CW	UX	Q6	5X	RH	XX	R8	AV	AZ									
GWM257	REG	GROUND WATER	GRAB		06/16/2003	GUARD WELLS	AQUIFER WELLS	USGS-107	477	1	1		1	1		1	1	1	1										
GWM258	REG/QC	GROUND WATER	DUP		06/16/2003	GUARD WELLS	AQUIFER WELLS	HIGHWAY 3	538	1	1		1	1	2	1	1	1	1										
GWM259	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	USGS-004	251	1	1		1	1		1	1	1	1										
GWM260	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	USGS-008	766	1	1		1	1		1	1	1	1										
GWM261	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	USGS-019	276	1	1		1	1		1	1	1		1									
GWM262	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	USGS-126B	420	1	1		1	1		1	1	1	1										
GWM263	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	USGS-026	212	1	1		1	1		1	1	1	1										
GWM264	REG/QC	GROUND WATER	DUP		06/16/2003	BASELINE WELLS	AQUIFER WELLS	USGS-027	228	2	2		2	2		2	2	2	2										
GWM265	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	DH-1B	268	1	1		1	1		1	1	1	1										
GWM266	REG	GROUND WATER	GRAB		06/16/2003	BASELINE WELLS	AQUIFER WELLS	P&W-3	304	1	1		1	1		1	1	1	1										
GWM267	QC	WATER	FBLK		06/16/2003	INEEL	FIELD BLANK	QC	NA	1	1		1	1		1	1	1	1										
GWM268	QC	WATER	FBLK		06/16/2003	INEEL	FIELD BLANK	QC	NA	1	1		1	1		1	1	1	1										
GWM269	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM270	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM271	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Anions
AT2: Bicarbonate
AT3: C-14
AT4: Iodine-129 (low detection level)
AT5: Nitrate (as Nitrogen)
AT6: Nitroaromatics (8330) MS/MSD
AT7: Radiochemistry - Suite 1
AT8: Total Metals - Filtered
AT9: Tritium
AT10: VOCs (Appendix IX TAL)

AT11: VOCs (Appendix IX TAL) - MS/MSD
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Total Metals = complete CLP TAL plus silica and strontium. The total metals contaminants of potential concern (COPCs) are: arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc.

Anions defined as chloride, sulfate, and fluoride

Analysis Suites:

Radiochemistry - Suite 1: Tc-99, Gross Alpha, Gross Beta, Gamma Spec, U-Iso, Sr-90

Contingencies:

Plan Table Number: WAG10 GW JUN 03

SAP Number: INEEL/EXT-01-01529 REV 2.

Date: 05/14/2003 Plan Table Revision: 5.0 Project: OU10-08 GROUND WATER, JUNE 2003 (FY-03 THIRD ROUND) Project Manager: WOOD, T. R. SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										AN	B9	CW	UX	Q6	5X	RH	XX	R8	AV	AZ									
GWM272	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM273	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM274	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM275	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM276	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM277	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM278	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										
GWM279	QC	WATER	TBLK		06/16/2003	INEEL	TRIP BLANK	QC	NA										1										

The sampling activity displayed on this table represents the first six characters of the sample identification number.

The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: Anions
AT2: Bicarbonate
AT3: C-14
AT4: Iodine-129 (low detection level)
AT5: Nitrate (as Nitrogen)
AT6: Nitroaromatics (8330) MS/MSD
AT7: Radiochemistry - Suite 1
AT8: Total Metals - Filtered
AT9: Tritium
AT10: VOCs (Appendix IX TAL)

AT11: VOCs (Appendix IX TAL) - MS/MSD
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Total Metals = complete CLP TAL plus silica and strontium. The total metals contaminants of potential concern (COPCs) are: arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc.

Anions defined as chloride, sulfate, and fluoride

Analysis Suites:

Radiochemistry - Suite 1: Tc-99, Gross Alpha, Gross Beta, Gamma Spec, U-Iso, Sr-90

Contingencies:

Appendix B

Figures Showing the Monitoring Well Locations

Appendix B

Figures Showing the Monitoring Well Locations

The Operable Unit 10-08 field team will collect groundwater samples on a regular, defined schedule from a limited number of boundary, guard, and baseline wells in Fiscal Years 2002, 2003, and 2004. These wells are shown in Figures B-1, B-2, and B-3.

INEEL Baseline Wells

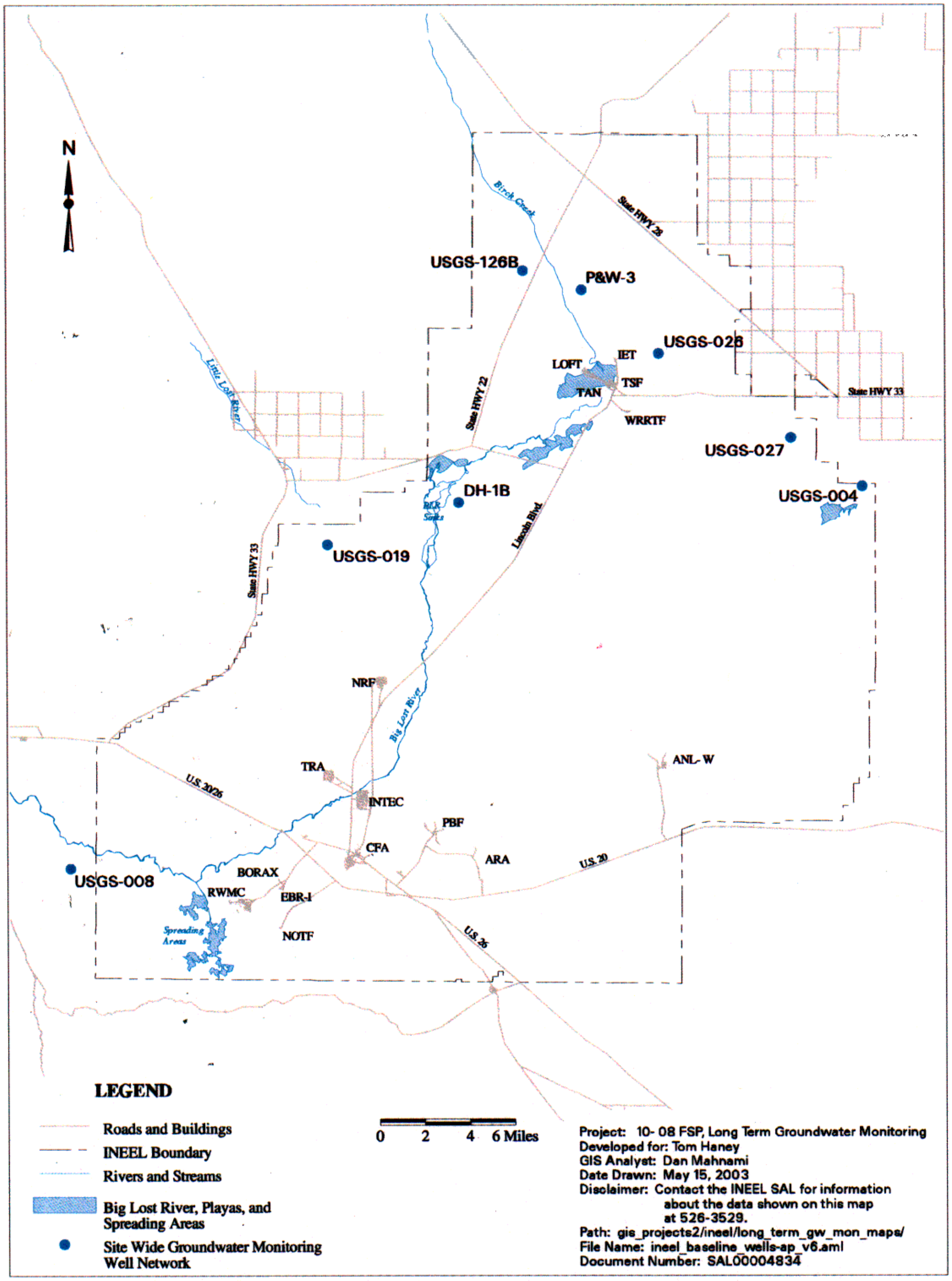

Figure B-1. Baseline wells at the Idaho National Engineering and Environmental Laboratory.

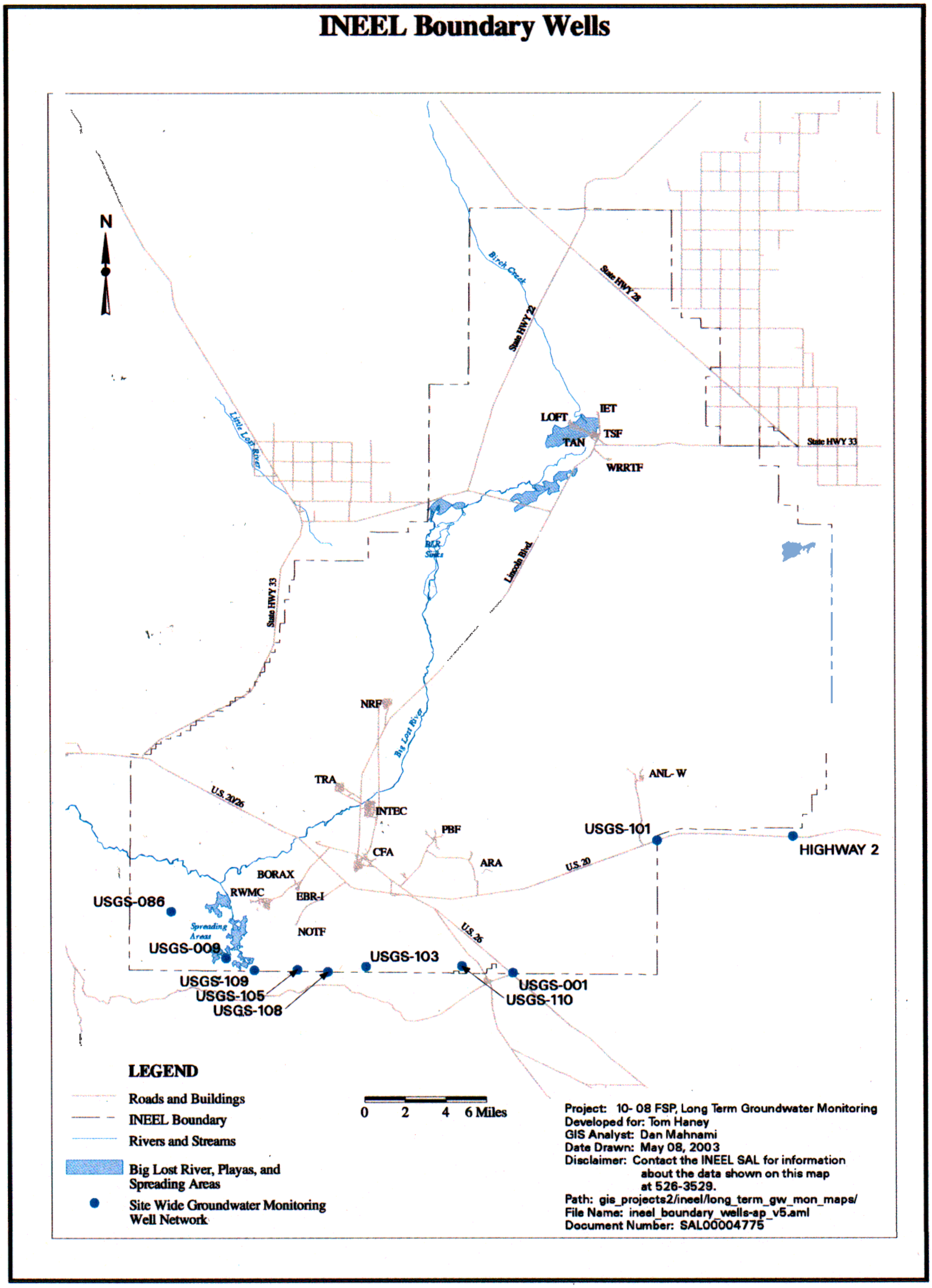

Figure B-2. Boundary wells at the Idaho National Engineering and Environmental Laboratory.

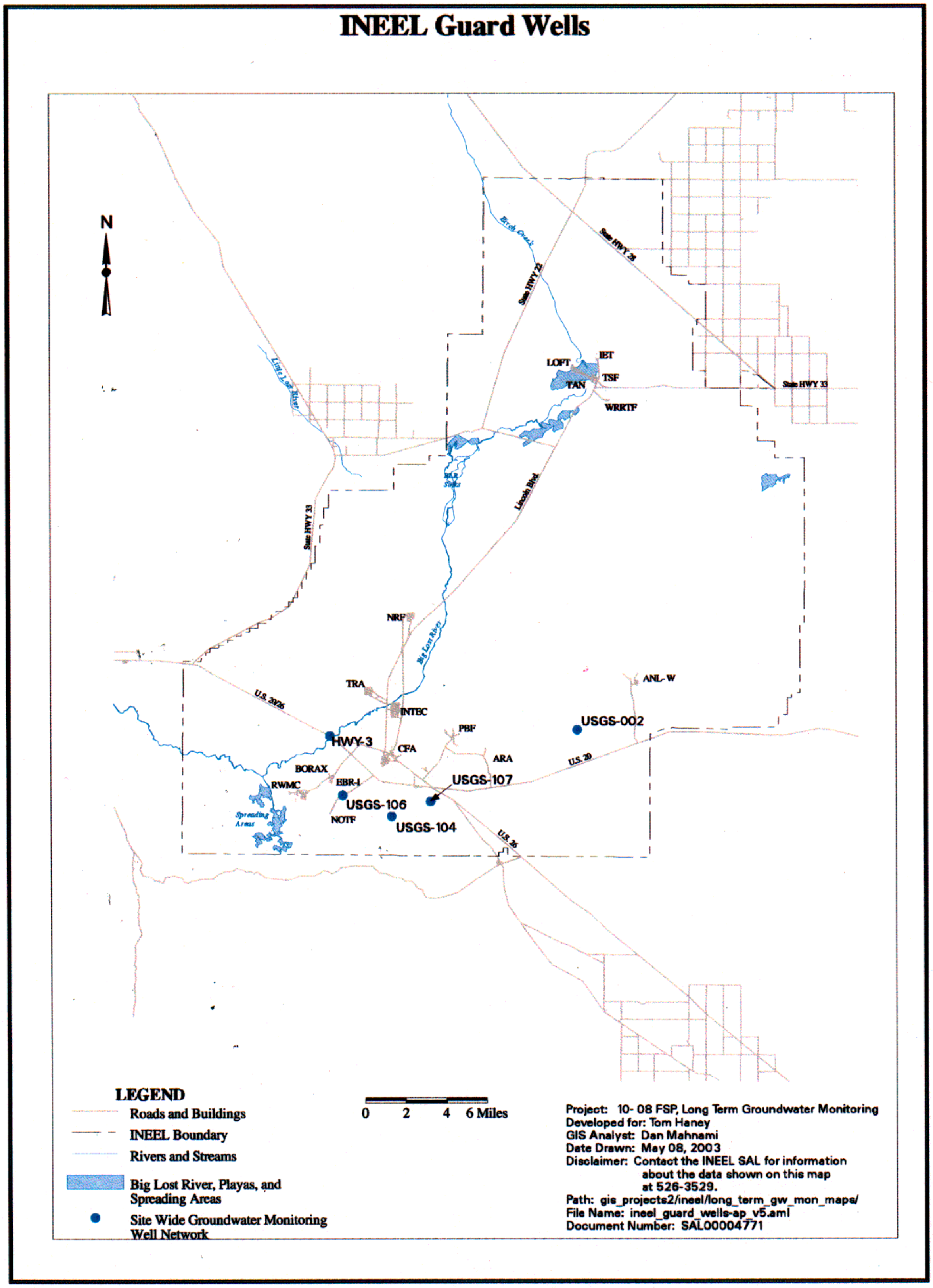

Figure B-3. Guard wells at the Idaho National Engineering and Environmental Laboratory.